

What is claimed is:

- 1 1. A system usable with a subterranean well having a casing, the system
2 comprising:
3 an apparatus associated with production of well fluid from the well and being located
4 downhole in the well in a passageway of the casing; and
5 a non-acoustic sensor located downhole near the apparatus in the passageway and
6 adapted to measure a characteristic of the well located outside of the casing.
- 1 2. The system of claim 1, wherein the apparatus comprises a packer.
- 1 3. The system of claim 2, wherein the packer is adapted to position the sensor
2 against an interior wall of the casing in an expanded state of the packer.
- 1 4. The system of claim 1, wherein the apparatus comprises a tubing.
- 1 5. The system of claim 4, wherein the sensor is part of a network of sensors
2 located inside a passageway of the tubing.
- 1 6. The system of claim 4, wherein the sensor is attached to an exterior wall of the
2 tubing.
- 1 7. The system of claim 1, wherein the sensor is attached to the apparatus.
- 1 8. The system of claim 1, wherein the sensor comprises a resistivity sensor, a
2 nuclear sensor, a gravity/force sensor, a pressure sensor or a temperature sensor.
- 1 9. The system of claim 1, wherein the sensor is adapted to measure the
2 characteristic without requiring puncturing of the well casing.

1 10. The system of claim 1, wherein the sensor is adapted to puncture the casing to
2 measure the characteristic.

1 11. A method usable with a subterranean well having a casing, the method
2 comprising:
3 producing fluid from the well;
4 positioning a non-acoustic sensor downhole inside a passageway of the casing; and
5 using the sensor during the producing to measure a characteristic of the well located
6 outside of the casing.

1 12. The method of claim 11, further comprising:
2 placing the sensor in a packer; and
3 deploying the packer downhole.

1 13. The method of claim 12, further comprising:
2 setting the packer; and
3 positioning the sensor against an interior wall in of the casing in response to the
4 setting.

1 14. The method of claim 11, further comprising:
2 deploying a tubing to support the sensor downhole.

1 15. The method of claim 14, further comprising:
2 deploying the sensor downhole inside a passageway of the tubing.

1 16. The method of claim 14, further comprising:
2 attaching the sensor to an exterior wall of the tubing.

1 17. The method of claim 14, further comprising:
2 attaching the sensor to an apparatus associated with the completion of the well.

1 18. The method of claim 11, wherein the sensor comprises a resistivity sensor, a
2 nuclear sensor, a gravity/force sensor, a pressure sensor or a temperature sensor.

1 19. The method of claim 11, wherein the using comprises:
2 using the sensor to measure the characteristic without requiring puncturing of the well
3 casing.

1 20. The method of claim 11, further comprising:
2 puncturing the casing to measure the characteristic.

1 21. A system usable with a subterranean well having a casing, the system
2 comprising:
3 a transmitter to contact an interior wall of the casing to transmit a first current;
4 a receiver to contact an interior wall of the casing to receive a second current
5 produced in response to the first current; and
6 a circuit coupled to receiver to use the second current to indicate a resistivity
7 measurement.

1 22. The system of claim 21, further comprising:
2 a packer attached to either the transmitter or receiver.

1 23. The system of claim 22, wherein the packer is adapted to position said either
2 the transmitter or receiver against the interior wall of the casing in an expanded state of the
3 packer.

1 24. The system of claim 21, further comprising:
2 a tubing attached to either the transmitter or receiver.

1 25. The system of claim 21, wherein the transmitter and receiver are part of a
2 network of sensors located inside a passageway of the tubing.

1 26. The system of claim 21, wherein either the transmitter or receiver is attached
2 to an exterior wall of the tubing.

1 27. The system of claim 21, wherein the casing comprises:
2 a first insulative section in contact with the receiver; and
3 a second insulative section in contact with the transmitter.

1 28. The system of claim 27, wherein the casing further comprises:
2 an electrically conducting section located between the first and second insulative
3 sections.

1 29. The system of claim 21, further comprises:
2 bow springs to establish the contacts for the receiver and transmitter.

1 30. The system of claim 21, wherein the casing comprises an electrically
2 conductive casing.

1 31. An apparatus usable with a subterranean well having a casing, the apparatus
2 comprising:
3 a punch to be positioned inside a passageway of the casing and pierce the casing to
4 establish communication with a region outside of the casing; and
5 a sensor to be positioned inside the passageway of the casing to indicate a
6 characteristic associated with the region.

1 32. The apparatus of claim 31, wherein the sensor indicates a resistivity associated
2 with the region.

1 33. The apparatus of claim 31, wherein the sensor indicates a nuclear
2 measurement associated with the region.

1 34. The apparatus of claim 31, wherein a force/gravity sensor indicates a density
2 associated with the region.

1 35. The apparatus of claim 31, further comprising:
2 sealing elements to seal off a portion of the casing pierced by the punch.

1 36. The apparatus of claim 31, further comprising:
2 at least one slip to secure the apparatus to the well casing.

1 37. The apparatus of claim 31, wherein the punch includes a cavity and the sensor
2 is located inside the cavity.

1 38. The apparatus of claim 31, wherein the punch moves to pierce the casing in
2 response to a packer being set.

1 39. The apparatus of claim 31, further comprising:
2 sleeves to compress the punch to force the punch into the casing.

1 40. The apparatus of claim 31, wherein the punch includes another passageway to
2 establish communication between the region and the sensor.

1 41. A packer comprising:
2 a tubular member;
3 sealing elements to form seals between the tubular member and a well casing and
4 form a sealed region between the seals;
5 a puncture device to be positioned inside a passageway of the casing and pierce the
6 casing to establish communication with a region outside of the casing; and
7 a sensor to be positioned inside the passageway of the casing to indicate a
8 characteristic associated with the region outside of the casing.

1 42. The packer of claim 41, wherein the puncture device comprises a punch.

1 43. The packer of claim 41, wherein the puncture device comprises a shaped
2 charge.

1 44. The packer of claim 41, wherein the sensor is in fluid communication with the
2 sealed region.

1 45. The packer of claim 41, wherein the sensor indicates one of a resistivity, a
2 nuclear measurement, a pressure and a gravity/pressure associated with the region.

1 46. The packer of claim 41, further comprising:
2 sleeves to force the punch into the casing.

1 47. The packer of claim 41, further comprising:
2 sleeves to concurrently force the punch into the casing and compress the sealing
3 elements.

1 48. The packer of claim 41, wherein the packer comprises a hydraulically set
2 packer.

1 49. The apparatus of claim 41, wherein the puncture device includes a passageway
2 to establish communication between the region and the sensor.

1 50. A method usable with a subterranean well having a casing, the method
2 comprising:
3 providing a puncture device inside a packer; and
4 actuating the puncture device when the packer is set to pierce the casing to establish
5 communication with a region outside of the casing.

1 51. The method of claim 50, further comprising:
2 sensing a characteristic of the region outside of the casing via the communication
3 established by the puncture device.

1 52. The method of claim 50, wherein the sensing comprises sensing one of a
2 resistivity, a pressure, a nuclear measurement and a gravity.

1 53. The method of claim 50, further comprising sealing off a portion of the casing
2 pierced by the punch.

1 54. The method of claim 50, wherein the puncture device comprises a shaped
2 charge.

1 55. The method of claim 50, wherein the puncture device comprises a punch.

1 56. The method of claim 55, further comprising actuating sleeves to force the
2 punch into the casing when the packer is set.

1 57. A method usable in a subterranean well, comprising:
2 establishing communication between an exterior of a casing of the well and a sealed
3 region defined by spaced elements of a packer.

1 58. The method of claim 57, wherein the establishing comprises:
2 piercing the casing.

1 59. The method of claim 58, wherein the piercing comprises:
2 piercing the casing with a shaped charge.

1 60. The method of claim 58, wherein the piercing comprises:
2 piercing the casing with a punch.

1 61. A method usable with a subterranean well, comprising:
2 establishing a sealed region downhole;
3 within the sealed region, piecing a casing of the well; and
4 without flowing fluids uphole from the sealed region, using the pierced casing to
5 measure a characteristic associated with a region outside of the casing.

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1 62. The method of claim 61, wherein the establishing comprises:
2 setting at least one packer downhole.

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1 63. The method of claim 61, wherein the piercing comprises:
2 using a shaped charge.

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1 64. The method of claim 61, wherein the piercing comprises:
2 using a punch.

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1 65. The method of claim 61, wherein the establishing comprises:
2 setting multiple spaced packers.

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1 66. The method of claim 61, further comprising:
2 selecting the region to measure one of a gravity, pressure, resistivity and nuclear
3 measurement associated with the region.

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1 67. A method usable with a subterranean well, comprising:
2 establishing at least one sealed region downhole;
3 in said at least one sealed region, piercing a casing of the well; and
4 without flowing fluids uphole from the sealed region, using the results of the piercing
5 to establish an array of downhole sensors.

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1 68. The method of claim 67, wherein the establishing comprises:
2 setting at least one packer downhole.

1 69. The method of claim 67, wherein the piercing comprises:
2 using a shaped charge.

1 70. The method of claim 67, wherein the piercing comprises:
2 using a punch.

1 71. The method of claim 67, wherein the establishing comprises:
2 setting multiple spaced packers.

1 72. The method of claim 67, further comprising:
2 selecting the region to measure one of a gravity, pressure, resistivity and nuclear
3 measurement associated with the region.

1 73. The method of claim 67, further comprising:
2 measuring a force associated with the piercing; and
3 using the measured force to derive a strength of a formation.

1 74. The method of claim 67, further comprising:
2 measuring a rate associated with the piercing; and
3 using the measured rate to derive a strength of a formation.

1 75. A system usable with a subterranean well having a casing, the system
2 comprising:
3 a packer to be lowered downhole inside the casing; and
4 a sensor attached to the packer to measure a characteristic of the well.

1 76. The system of claim 75, wherein the packer is adapted to position the sensor
2 against an interior wall of the casing in an expanded state of the packer.

1 77. The system of claim 75, wherein the sensor comprises a resistivity sensor, a
2 nuclear sensor, a gravity/force sensor, a pressure sensor or a temperature sensor.

1 78. The system of claim 75, wherein the sensor is mounted inside the packer to
2 measure fluids flowing through the packer.

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1 79. A system usable with a subterranean well, comprising:
2 an apparatus to be located downhole inside a casing of the well; and
3 a projectile deployment device to produce a projectile to pierce the casing of the well,
4 wherein the projectile includes a sensor to perform a measurement associated with the well.

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1 80. The system of claim 79, further comprising:
2 a tethered communication connection between the projectile and the packer.

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1 81. The system of claim 79, wherein the projectile communicates via a wireless
2 link with the packer.